

# EPIDEMIOLOGICAL STUDY OF FOOT AND ANKLE INJURIES IN RECREATIONAL SPORTS

ALEXANDRE DE PAIVA LUCIANO<sup>1</sup>, LUIZ CARLOS RIBEIRO LARA<sup>2</sup>

## ABSTRACT

**Objective:** This is a retrospective study showing the incidence, type and extent of injuries occurring in the foot and/or ankle as a result of recreational sports practice. **Methods:** We treated 131 patients, of which 123 were male and 8 female, with a history of trauma and pain in the foot and/or ankle after the practicing recreational sports. The average age of the male patients was 24.53 years. The evaluation was done through a research protocol, which contained the variables age, sex, diagnosis, and type of recreational sport. **Results:** The sports were classified according to the American Medical Association, which divides them into contact

and non-contact sports. 82.4% of the sample practiced contact sports, while 17.6% practiced sports classified as non-contact. **Conclusions:** The sprained ankle was the most frequent type of injury, especially those of grade I and II. Soccer was the sport responsible for the highest incidence of injuries and among its various forms the indoor soccer presented the highest frequency of injuries (35%). In the non-contact sports, the highest incidence was found in running. **Level of Evidence IV, Case Series.**

**Keywords:** Foot injuries. Ankle injuries. Sports. Wounds and injuries.

**Citation:** Luciano AP, Lara LC. Epidemiological study of foot and ankle injuries in recreational sports. *Acta Ortop Bras.* [online]. 2012;20(6):339-42. Available from URL: <http://www.scielo.br/aob>.

## INTRODUCTION

In conducting a retrospective study of the evolution of sports in our country, particularly in the last two decades, we can confirm that progress has undeniably been made.<sup>1</sup>

Actually, what makes us feel most enthusiastic is not just high level sport, but the population's awareness of the importance of the practice of physical activity for their health. Despite few recent epidemiologic studies, we can see that people are exercising with increasing frequency in parks, clubs and fitness centers. Even though it is far from ideal, this scenario is highly encouraging for a future projection.

Injury is an undesirable effect in these activities, as it reduces the benefits involved in sports and physical activities, acting as a barrier to the resumption of sport.<sup>2</sup>

One of the first steps in reducing orthopedic injuries in sports and in recreational activities is to establish the nature and extent of this problem.<sup>2</sup>

The objective of the present survey is to obtain information about the incidence, type of sport and extent of injuries to the foot and ankle resulting from the practice of recreational sports.

## CASUISTRY AND METHOD

The study consisted of a descriptive and retrospective analysis. It was carried out for six months, from June 2004 to January 2005, at Hospital Universitário e Pronto-socorro Municipal Taubaté – SP.

For the descriptive analysis we calculated: mean, standard deviation, minimum, median, maximum, frequency and percentage. The chi-square test was used to compare the variables of interest by age bracket and sport causing injury. The significance level considered was 5% ( $p\text{-value} \leq 0.05$ ).

Most of the patients were male, 123 individuals, against just 8 females. Due to the small casuistry of injuries that occurred in female patients and the statistical insignificance, the female sex became an exclusion factor in the present survey.

All of the participants presented complaints of pain or traumatism in the foot and/or ankle, during the practice of recreational sports. In the male patients, the age ranged from 12 to 56 years, averaging 24.6 years.

The evaluation was executed through a survey protocol, which contained the variables of sex, age, established diagnosis,

All the authors declare that there is no potential conflict of interest referring to this article.

1. Department of Orthopedics and Traumatology of the School of Medicine of Taubaté. SP. Arthroscopy and Sports Traumatology Study Group of Hospital Universitário de Taubaté SP. Service of Prof. Dr. Nelson Franco Filho.

2. Department of Orthopedics and Traumatology of the School of Medicine of Taubaté. SP. Group of Foot and Ankle Pathologies of Hospital Universitário de Taubaté – SP. Service of Prof. Dr. Nelson Franco Filho.

Study conducted in the Department of Orthopedics and Traumatology of the School of Medicine of Taubaté. SP. Mailing address: Rua Joaquim Tavares 203, Ap. 52 Centro. Taubaté, SP, Brazil. CEP12020-280. Email: alexandrepaiva76@ig.com.br

affected side and type of recreational sport involved. (Table 1) We based our survey on the classification of sports, according to the American Medical Association (1976), which divides sports into: contact and non-contact.<sup>3</sup> For the established diagnoses we used the following classifications: in degrees (I, II, III),<sup>4</sup> for ankle sprains; anatomical, for foot fractures;<sup>4</sup> Denis - Weber, for ankle fractures;<sup>5</sup> Salter - Harris, for physeal fractures.<sup>6</sup>

**Table 1.** Survey protocol.

	Age (a)	Sex	Diagnosis	Side	Type		Age (a)	Sex	Diagnosis	Side	Type
1-	27	M	ETL2	R	FC	67-	12	M	FRT TRN	L	SK
2-	26	M	ETL1	L	VB	68-	35	M	FRT TRN	R	FC
3-	32	M	CNT foot	R	FC	69-	15	M	FRT TRN	L	SK
4-	45	M	FRT foot	R	FS	70-	16	M	CNT foot	L	FS
5-	16	M	TND CAL	L	C	71-	28	M	ETL2	R	FS
6-	28	M	ETL1	L	HB	72-	21	M	CNT foot	R	FSC
7-	32	M	FSC	R	C	73-	21	M	FRT TRN	R	FS
8-	19	M	FRT TRN	R	BB	74-	22	M	ETL2	R	FC
9-	54	M	CNT foot	L	FC	75-	22	M	ETL1	L	C
10-	23	M	ETM2	L	VB	76-	22	M	FRT TRN	L	FS
11-	33	M	CNT foot	R	FC	77-	22	M	ETL2	R	FC
12-	22	M	CNT foot	R	FA	78-	24	M	ETL1	R	FS
13-	30	M	ETL2	R	T	79-	26	M	FRT TRN	L	FC
14-	24	M	FRT foot	L	FC	80-	27	M	FRT foot	R	FC
15-	21	M	ETM2	R	C	81-	22	M	ETL1	L	FC
16-	17	M	CST foot	L	SK	82-	23	M	ETL2	L	BB
17-	43	M	FRT foot	L	BB	83-	22	M	CNT foot	R	FC
18-	31	M	TND CAL	R	M	84-	19	M	ETL1	R	FS
19-	46	M	ETL1	R	T	85-	15	M	FRT foot	R	FA
20-	16	M	FRT TRN	R	J	86-	52	M	ETL2	L	FC
21-	16	M	BR 1MTT	L	FC	87-	28	M	ETL2	R	FS
22-	15	M	CNT foot	L	FC	88-	14	M	FRT foot	R	FC
23-	25	M	ETL2	L	FS	89-	33	M	CNT foot	L	FSC
24-	18	M	ETL2	R	FA	90-	23	M	CNT foot	R	FC
25-	18	M	ETM2	L	J	91-	16	M	ETL1	R	FS
26-	22	M	ETL2	L	FC	92-	32	M	ETL2	R	FC
27-	28	M	FSC	L	BB	93-	19	M	C of foot	L	FC
28-	30	M	FSC	R	C	94-	36	M	FRT foot	R	FS
29-	35	M	FSC	R	C	95-	28	M	LX PDD	R	FSC
30-	25	M	CNT TRN	L	FC	96-	17	M	ETL1	R	FS
31-	14	M	ETL1	R	FS	97-	12	M	ETL1	R	FS
32-	16	M	ETL1	R	FS	98-	33	M	FRT foot	L	FSC
33-	19	M	CNT foot	R	FS	99-	16	M	FRT foot	R	FS
34-	21	M	FRT TRN	R	SK	100-	18	M	ETM1	R	FS
35-	46	M	FRT TRN	R	FSC	101-	15	M	FRT foot	R	FS
36-	33	M	FRT TRN	R	FSC	102-	23	M	ETL1	R	FS
37-	25	M	FRT foot	R	FS	103-	15	M	ETL1	R	FS
38-	20	M	ETL1	R	FSC	104-	23	M	CNT foot	R	FS
39-	22	M	ETL2	L	VB	105-	23	M	ETL2	L	FS

M = male; F = female; ETL 1 = mild lateral ankle sprain; ETL 2= moderate lateral ankle sprain; ETM 1 = mild medial ankle sprain; ETM 2 = moderate medial ankle sprain; PDD = finger; MTT = metatarsal; D = right; E = left; FC = turf soccer; FS = futsal; FA= sand soccer; FSC = indoor arena soccer; VB = volleyball; BB = basketball; SK = skateboarding; HB = handball; C = running; J = judo; T = tennis; CNT = contusion; LX = dislocation; FRT = fracture; TRN = ankle; TND = tendinitis; CAL = calcaneal; ET = sprain; RP = rupture; FSC = fasciitis; BR = bursitis.

Source: Hospital Universitário e Pronto-socorro Municipal de Taubaté – SP.

	Age (a)	Sex	Diagnosis	Side	Type		Age (a)	Sex	Diagnosis	Side	Type
40-	22	M	FRT TRN	R	FC	106-	14	M	ETL2	L	SK
41-	27	M	ETL1	R	FC	107-	12	M	ETL1	R	CAP
42-	21	M	ETL2	L	FC	108-	30	M	ETL2	R	FC
43-	15	F	FRT foot	L	FC	109-	19	M	ETL2	R	FS
44-	22	F	ETL2	L	HB	110-	18	M	ETL1	L	FC
45-	12	F	FRT TRN	L	HB	111-	21	M	CNT foot	R	FS
46-	12	F	ETL1	R	BB	112-	22	M	ETL2	R	VB
47-	16	F	ETL1	L	FC	113-	16	F	FRT foot	L	FC
48-	28	M	FRT TRN	R	FS	114-	18	M	FRT foot	R	FA
49-	15	M	FRT TRN	L	SK	115-	25	M	ETL1	L	FC
50-	19	M	FRT TRN	R	FC	116-	18	M	ETL1	L	FS
51-	28	M	ETL2	R	C	117-	15	M	TND CAL	R	T
52-	52	M	FRT TRN	L	FC	118-	22	M	ET foot	L	FA
53-	18	M	FRT TRN	L	FC	119-	15	M	ETL2	R	FS
54-	32	M	FRT TRN	R	FC	120-	36	M	ENT foot	L	FC
55-	21	M	ETL2	R	FS	121-	17	M	ETL2 D	R	BB
56-	43	M	FRT TRN	L	FSC	122-	22	M	CNT foot	L	FC
57-	16	M	ETL1	R	SK	123-	19	M	ETL2	R	FC
58-	47	M	ETL1	R	FSC	124-	16	M	ETL3	L	FS
59-	23	M	ETL1	L	FC	125-	56	M	RP T. Cal	R	FC
60-	22	M	ETM1	L	FS	126-	32	M	ETL1	R	FC
61-	59	M	ETL1	R	FS	127-	16	M	CNT foot	L	SK
62-	16	M	CNT foot	L	FS	128-	28	M	FSC	L	C
63-	18	M	ETL2	L	FC	129-	15	F	ETL2	R	FS
64-	32	M	LX PDD	L	FS	130-	18	F	ETL1	L	FC
65-	18	M	ETM2	R	FC	131-	22	M	ETL2	R	FC
66-	14	M	ETM1	L	FC						

M = male; F = female; ETL 1 = mild lateral ankle sprain; ETL 2= moderate lateral ankle sprain; ETM 1 = mild medial ankle sprain; ETM 2 = moderate medial ankle sprain; PDD = finger; MTT = metatarsal; D = right; E = left; FC = turf soccer; FS = futsal; FA= sand soccer; FSC = indoor arena soccer; VB = volleyball; BB = basketball; SK = skateboarding; HB = handball; C = running; J = judo; T = tennis; CNT = contusion; LX = dislocation; FRT = fracture; TRN = ankle; TND = tendinitis; CAL = calcaneal; ET = sprain; RP = rupture; FSC = fasciitis; BR = bursitis.

Source: Hospital Universitário e Pronto-socorro Municipal de Taubaté – SP.

## RESULTS

The contact sports were soccer, basketball, handball and judo, totaling 101 patients (82.4% of the total sample), while the non-contact sports were volleyball, running, tennis and skateboarding, with a total of 22 cases (17.6%).

For the male patients assessed in the present survey, the right side was the most affected, with 76 cases (58%), and the left, with 55 cases (42%).

The most common injuries in the study were ankle sprains (49%), fractures (25%), contusions (17%), fasciitis (4%), tendon injuries (2%), dislocations (2%) and bursitis (1%). (Figure 1) Analyzing ankle sprains separately, grade I lateral sprain was the most common, with 45.3% of the cases; grade II was found in 43.7% of the cases and we found only 1 case of grade III lateral ankle injury. Grade I medial sprain affected 4.6% and grade II, 6.2% of the cases. We did not find any grade III medial ankle sprain. (Figure 2) Among the fractures, the most common was the ankle fracture,

with 72% of the cases, followed by phalangeal fractures, with 21%, and metatarsal fractures with 7%.

Soccer was the main cause of injuries among the analyzed individuals, 97 patients (74.04%), verifying a significant difference,  $\alpha = 0.05$ . (Figure 3)

Injuries resulting from soccer were divided percentually according to the types of surface: *futsal* (indoor court), 44 cases (43%); turf, 36 cases (40%); indoor arena soccer, 9 cases (8%) and sand, 5 cases (4%). (Table 2)

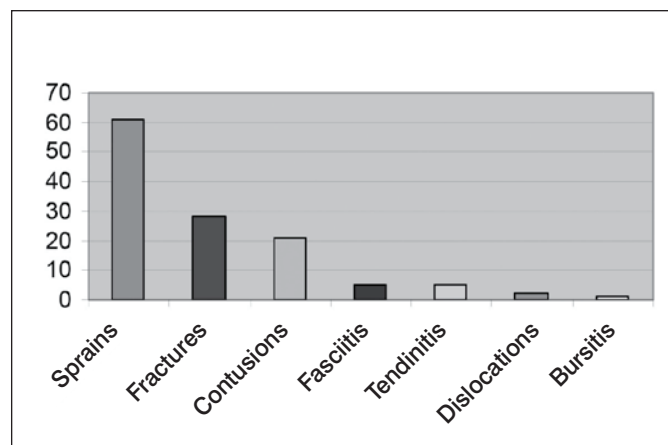


Figure 1. Incidence of injuries in the male patients.

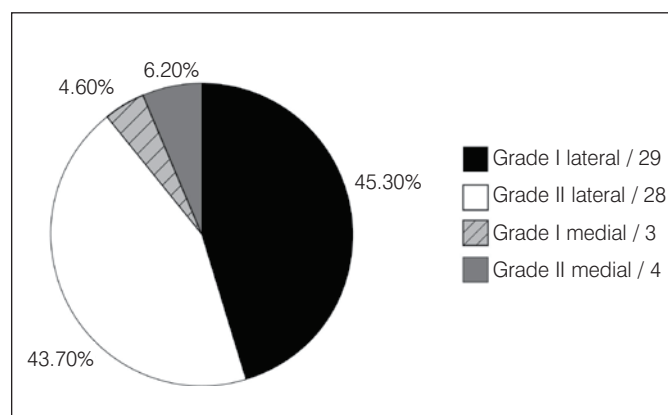


Figure 2. Incidence of ankle sprains in the male patients.

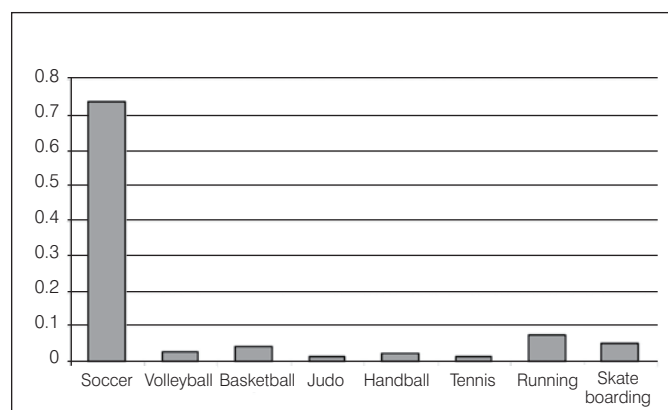


Figure 3. Types of sport practiced and percentage of injuries.

Table 2. Incidence of injuries in the categories of soccer.

	Sprain	Fractures	Contusions	Dislocations	Tendon Injuries	Total
Turf	22	07	06	-	01	36
Futsal	22	11	10	01	-	44
Sand	02	02	01	-	-	05
Indoor Arena	02	04	02	01	-	09
Total	48	24	19	02	01	94

Source: Hospital Universitário e Pronto-socorro Municipal de Taubaté – SP.

## DISCUSSION

In our field there are few studies related to injuries resulting from the practice of sports in recreational activities, which motivated us to address this issue.

There is a growing concern shared by the population in general regarding the need to practice a physical activity. However, our findings show that the female public may not have contact sport as their main choice, which perhaps justifies the significant incidence of these injuries in male patients.

Recent retrospective studies in Canada, through questionnaires for the population seeking information about variables such as sex, age, frequency of sports practice and injuries in relation to recreational sports provided us with a view of the incidence of these injuries in the population of that country.<sup>7</sup>

Retrospective studies showed that the foot and ankle injuries were common in athletic activities.<sup>8-10</sup> These injuries assume importance in medical practice due to their high incidence, besides the social and economic cost arising from the temporary or permanent interruption of activities that they entail for elite athletes and the general population.<sup>9</sup>

We noticed that foot and ankle injuries are common in sports, occurring in all age brackets, from 12 to 56 years, the same observed by Renström and Lynch.<sup>11</sup> Axelsson et al.<sup>12</sup> found an average age of 35 years in foot and ankle injuries, higher than that found in this study, which was 25 years.

Similar to the studies by Mummery et al.,<sup>13</sup> the vast majority of our patients were male, 93% of the sample.

Publications indicated the ankle sprain as being one of the main sports injuries, occurring in 25% of all injuries.<sup>12,13</sup> Several methods for classifying acute ankle ligament injuries have been proposed, but the most widely used combines clinical, radiological and anatomical data.<sup>4</sup>

Half of the patients analyzed by use presented this injury. However, in spite of this statistical reality, the difficulty of establishing a precise diagnosis in the emergency assessment of this injury, and the decrease in pain after the introduction of the initial treatment, mean that patients often fail to return to continue outpatient treatment. Katcherian<sup>14</sup> showed in his study that 20 - 40% of the cases of ankle ligament injuries treated conservatively evolved with some residual symptom.

Lateral ankle sprains were more significant than medial sprains, with 90% of the cases, corroborating the series studied by Jackson et al.,<sup>4</sup> Garrick,<sup>15</sup> and Ryan et al.<sup>16</sup>

The foot and ankle fractures occurred mostly in soccer, judo

and skateboarding, when related to the other sports, as observed by McLatchie et al.<sup>17</sup>

Brazil is considered the "Country of Soccer", its most popular sport. Soccer can be considered a sport in which the players present different physiological characteristics. It is a sport that implies the practice of intermittent exercises, of variable intensity.<sup>18</sup> Almost all Brazilians, particularly the men, have played or currently play soccer, which is the main reason for our sports-related traumas.

Chomiak et al.,<sup>19</sup> according to the present survey, in a prospective study with the purpose of analyzing the factors related to the occurrence of injuries in soccer players, noticed that trauma was the agent responsible for injury in 81.5%, while the other injuries occurred because of overuse. According to these authors, variables such as age, previous injuries, inadequate physical condition, overuse, conditions of surface and use of protective equipment are some of the factors that influence the occurrence of injuries. Among the types of soccer, *futsal* was the number one cause of injuries, probably because of the type of surface, weight of the ball and smaller court size, which leads to greater physical contact among participants.<sup>20,21</sup> Injuries are predominant in the lower limbs, with the exception of the goalkeepers, whose upper limbs are more affected.<sup>22</sup>

We draw the attention of individuals who practice recreational sports activities, as a physical and mental health option, to respect their limits of tolerance. We believe that injuries caused by practicing sports can be decreased by guaranteeing a complete pre-activity medical evaluation, knowledge of the individual characteristics, degree of physical conditioning, particularities of the specific activity, solicited muscle groups, use of protective gear recommended for the different sports, use of appropriate footwear in terms of the type of stride and surface, correct learning of movements and sports techniques in the incorporation of physical activity as a regular habit into the lives of individuals.

## CONCLUSION

The injuries in the male sex were significantly greater than in the female sex.

Ankle sprains were the significantly predominant type of injury found.

Grade I and II lateral ankle sprains were the most common.

Soccer was the sport responsible for the highest incidence of foot and ankle injuries.

*Futsal* was the main cause of injuries, among the various categories of soccer.

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